EUROPEAN PATENT OFFICE

(2) 4

F. 104 503

Patent Abstracts of Japan

PUBLICATION NUMBER : 2001102016
PUBLICATION DATE : 13-04-01

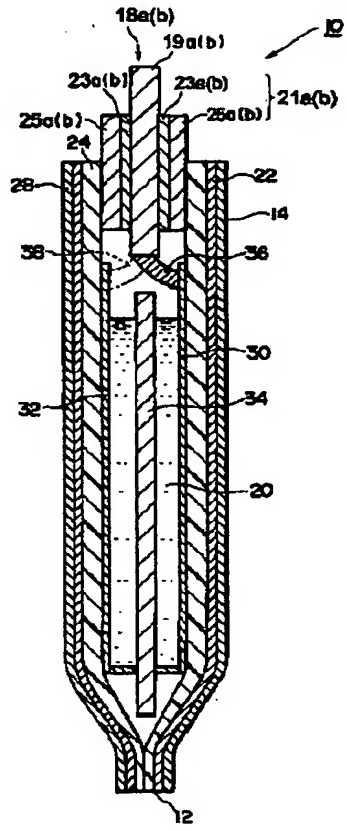
APPLICATION DATE : 25-11-99
APPLICATION NUMBER : 11334389

APPLICANT : SUMITOMO ELECTRIC IND LTD;

INVENTOR : YADOSHIMA SATOSHI;

INT.CL. : H01M 2/06 H01M 2/30 H01M 10/40 // H01M 6/16

TITLE : LEAD WIRE FOR NON-AQUEOUS ELECTROLYTE CELL



ABSTRACT : PROBLEM TO BE SOLVED: To provide a lead wire for a non-aqueous electrolyte electric cell, that, in the non-aqueous electrolyte cell, can sufficiently ensure insulating property between a lead conductor and a metallic layer of an envelope.

SOLUTION: The lead wire 18a for the non-aqueous electrolyte electric cell is fused on the inner surface of envelope 14. The envelope 14 has a metallic layer 22 therein and is filled with a non-aqueous electrolyte medium 20, a positive electrode 30, and a negative electrode 32. The lead wire 18a comprises a lead conductor 19a electrically connected to the positive electrode 30, and an insulator 21a cladding the lead conductor 19a and fused on the inner surface of the envelope 14. The insulator 21a includes at least a cross-linked layer 23a made of cross-linked polyolefin resin. According to this invention, as the insulator 21a includes the cross-linked layer 23a made of the cross-linked polyolefin resin, when the lead wire 18a is attached by thermal fusion, a short between the lead conductor 19a and the metallic layer 22 of envelope 14 is sufficiently prevented due to the fusion of the insulator.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-102016
(43)Date of publication of application : 13.04.2001

(51)Int.CI. H01M 2/06
H01M 2/30
H01M 10/40
// H01M 6/16

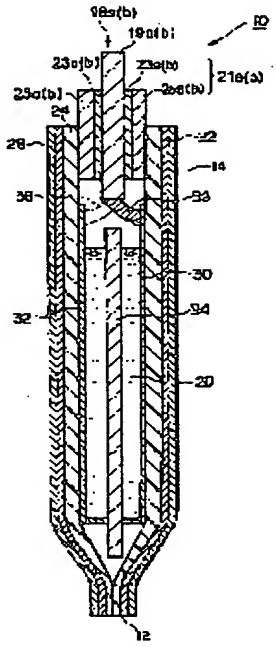
(21)Application number : 11-334389
(22)Date of filing : 25.11.1999

(71)Applicant : SUMITOMO ELECTRIC IND LTD
(72)Inventor : HOSOKAWA TAKEHIRO
TANAKA KEIICHI
YADOSHIMA SATOSHI

(30)Priority
Priority number : 11212182 Priority date : 27.07.1999 Priority country : JP

(54) LEAD WIRE FOR NON-AQUEOUS ELECTROLYTE CELL

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a lead wire for a non-aqueous electrolyte electric cell, that, in the non-aqueous electrolyte cell, can sufficiently ensure insulating property between a lead conductor and a metallic layer of an envelope.
SOLUTION: The lead wire 18a for the non-aqueous electrolyte electric cell is fused on the inner surface of envelope 14. The envelope 14 has a metallic layer 22 therein and is filled with a non-aqueous electrolyte medium 20, a positive electrode 30, and a negative electrode 32. The lead wire 18a comprises a lead conductor 19a electrically connected to the positive electrode 30, and an insulator 21a cladding the lead conductor 19a and fused on the inner surface of the envelope 14. The insulator 21a includes at least a cross-linked layer 23a made of cross-linked polyolefin resin. According to this invention, as the insulator 21a includes the cross-linked layer 23a made of the cross-linked polyolefin resin, when the lead wire 18a is attached by thermal fusion, a short between the lead conductor 19a and the metallic layer 22 of envelope 14 is sufficiently prevented due to the fusion of the insulator.



LEGAL STATUS

[Date of request for examination]	18.01.2000
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3114174
[Date of registration]	29.09.2000
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	

*.NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the lead wire used for the nonaqueous electrolyte cell as a power supply of electronic equipment etc., and relates to the lead wire used for the nonaqueous electrolyte cell which equips a detail with the bag body which encloses a positive electrode, a negative electrode, a nonaqueous electrolyte medium, etc. more.
[0002]
[Description of the Prior Art] According to the demand of a miniaturization of electronic equipment, the demand of the miniaturization of the cell used as the power supply and lightweight-izing has become strong. On the other hand, the formation of high-energy density and high-energy increase in efficiency to a cell are also called for. In order to fill such a demand, the expectation for the nonaqueous electrolyte cells (for example, Li ion cell etc.) by which an electrode, the electrolytic solution, etc. were enclosed with the interior of the bag body which mainly consists of synthetic resin etc. is growing.
[0003] In such a nonaqueous electrolyte cell, in order to take out current outside, it is common that lead wire is prolonged from the bag body, and a bag body is equipped with lead wire as follows. That is, some lead wire is inserted in the interior of the bag body which has opening from the opening, where lead wire is inserted by the inside of the opening edge of a bag body, the opening edge is heat sealed, and lead wire is attached in a bag body in this way. And in such a nonaqueous electrolyte cell, in order that the sealing performance of a bag body may influence the reliability of a cell, the thing of the structure whose metal layer was pinched between plastic film is well used as a bag body.
[0004] conventionally, as a lead wire used in such a nonaqueous electrolyte cell, it is indicated by JP,3-62447,A and JP,57-115820,A, for example -- as -- the lead of aluminum etc. -- it is indicated by the thing and JP,9-265974,A which consist only of a conductor -- as -- a lead -- what covered the insulator which turns into a conductor from thermoplastics is known
[0005]
[Problem(s) to be Solved by the Invention] however, the nonaqueous electrolyte cell indicated by JP,3-62447,A mentioned above and JP,57-115820,A -- setting -- a lead -- the time of a conductor being attached in a bag body -- a bag body and a lead -- the resin between conductors -- heat weld -- fusing -- a lead -- the conductor may have short-circuited with the metal layer of a bag body moreover, the nonaqueous electrolyte cell indicated by JP,9-265974,A -- also setting -- a lead -- the time of a conductor being attached in a bag body -- a lead -- the insulator between a conductor and the metal layer of a bag body -- fusing -- a lead -- there was a possibility that the metal layer of a conductor and a bag body might short-circuit
[0006] then, this invention -- a nonaqueous electrolyte cell -- setting -- a lead -- it aims at offering the lead wire for nonaqueous electrolyte cells which can fully secure insulation with the metal layer of a conductor and a bag body
[0007]
[Means for Solving the Problem] the result examined wholeheartedly for this invention persons to make the above-mentioned purpose attain -- a lead -- constituting so that the bridge formation layer which consists of a polyolefine system resin with which covered the conductor with the insulator and the insulator constructed the bridge may be included -- it is -- a nonaqueous electrolyte cell -- setting -- a lead -- it finds out that the short-circuit between a conductor and the metal layer of a bag body can fully be prevented, and came to complete this invention
[0008] namely, the lead which this invention is a lead wire for nonaqueous electrolyte cells welded to the inside of the bag body which encloses a nonaqueous electrolyte medium, a positive electrode, and a negative electrode, including a metal layer, and is electrically connected to a positive electrode or a negative electrode -- a conductor and a lead -- a conductor is covered, and it has the insulator welded to the inside of a bag body, and is characterized by including the bridge formation layer which an insulator becomes from bridge formation polyolefin resin at least
[0009] a lead according to melting of an insulator since the bridge formation layer which an insulator becomes from bridge formation polyolefin resin is included according to this invention, when lead wire is attached in a bag body by heat weld -- the short-circuit between a conductor and the metal layer of a bag body is fully prevented
[0010] the above-mentioned lead wire -- setting -- an insulator -- a lead -- it is desirable that the thermoplastic layer which pastes a conductor and consists of thermoplastic polyolefin resin is included since [in this case,] thermoplastic polyolefin resin has an adhesive property by heating -- a lead -- the adhesion of a conductor and a thermoplastic layer is secured
[0011] a lead -- as for the bond strength of a thermoplastic layer to a conductor, it is desirable that they are 4.9 or more N/cm When the nonaqueous electrolyte medium by which a bond strength is used for a nonaqueous electrolyte cell by

less than 4.9 N/cm is nonaqueous electrolyte, there is an inclination which the electrolytic solution leaks from a bag body.
[0012] As for the gel molar fraction of bridge formation polyolefin resin, it is desirable that it is 20 - 90%. the time of less than 20% of the degree of bridge formation being [a gel molar fraction] insufficient, and carrying out heat weld of the insulator of lead wire with the inside of a bag body -- bridge formation polyolefin resin -- fusing -- a lead -- there is an inclination for the metal layer of a conductor and a bag body to short-circuit Moreover, when a gel molar fraction exceeds 90%, the degree of bridge formation is too large, the adhesive property between an insulator and a bag body becomes bad, and there is an inclination for exsorption of the electrolytic solution to take place in the nonaqueous electrolyte cell using nonaqueous electrolyte as a nonaqueous electrolyte medium.
[0013] Moreover, as for bridge formation polyolefin resin, it is desirable that a bridge is constructed by irradiation of ionizing radiation from a viewpoint of productivity.
[0014] Furthermore, as for thermoplastic polyolefin resin, it is desirable that they are one sort or two sorts or more of mixture chosen from the group which consists of polyethylene, acid denaturation polyethylene, and an ionomer. the above-mentioned thermoplastic polyolefin resin -- heating -- fusing -- a lead -- it can paste up easily with a conductor
[0015] Moreover, it is desirable that thermoplastic polyolefin resin is polypropylene or acid denaturation polypropylene.
[0016] When welded to the bag body using the polypropylene which is excellent in thermal resistance as a material which constitutes the inside of the bag body of a nonaqueous electrolyte cell according to this lead wire, as compared with the case where polyethylene and an ethylene-vinyl acetate copolymer are used as thermoplastic polyolefin resin, it becomes possible to raise the adhesive property of an insulator and a bag body, and the thermal resistance of a nonaqueous electrolyte cell.
[0017]
[Embodiments of the Invention] Hereafter, the suitable operation gestalt of the lead wire for nonaqueous electrolyte cells of this invention is explained. In addition, suppose that the same sign is given to a same or equivalent component in a drawing.
[0018] Drawing 1 is the perspective diagram showing the suitable operation gestalt of the lead wire of this invention. The lead wire of this invention is built into the nonaqueous electrolyte cell 10 of a light-gage form as shown in drawing 1 . This nonaqueous electrolyte cell 10 is constituted by enclosing the single electrochemical cell containing the nonaqueous electrolyte (nonaqueous electrolyte medium) by which the electrolyte (for example, lithium compound) was dissolved in the solvent (for example, organic solvent) of non-water with the enclosure bag (bag body) 14 with which the portion 12 by which heat weld is carried out and the periphery section is heat sealed was formed. In this nonaqueous electrolyte cell 10, the end of the 1st lead-wire 18a and 2nd lead-wire 18b is prolonged in the upper part from the upper part of the enclosure bag 14, and enables electric connection with the exterior. in addition, the 1st lead-wire 18a and 2nd lead-wire 18b -- respectively -- the 1st lead -- conductor 19a and the 2nd lead -- a conductor -- it has 19b and Insulators 21a and 21b are covered by those peripheries, respectively
[0019] Drawing 2 is the cross section which met the A-A line or B-B line of the nonaqueous electrolyte cell 10 of drawing 1 . As shown in drawing 2 , this enclosure bag 14 consists of a multilayer film formed when the layers 24-28 which consist of a plastics layer pinched the metallic foil or the metal layer 22 which consists of aluminum, for example from a viewpoint which suppresses osmosis of nonaqueous electrolyte 20.
[0020] If it states to a detail more, the enclosure bag 14 is formed by [of the above-mentioned multilayer film in contact with nonaqueous electrolyte 20] carrying out heat weld of the periphery section of the inside layer 24 most. Here, most, the inside layer 24 consists of a maleic-acid denaturation polyolefine (for example, maleic-acid denaturation low density polyethylene), for example, most, in order that [of the enclosure bag 14] the outside layer 28 may protect the metal layer 22 from a lesion, it is prepared by the viewpoint which prevents exsorption of the nonaqueous electrolyte 20 in the heat-sealing portion 12 formed in the periphery section of the inside layer 24 of a multilayer film, for example, it consists of a PET (polyethylene terephthalate).
[0021] Moreover, what the solute which becomes organic solvents, such as propylene carbonate and gamma-butyrolactone, from a lithium compound like LiClO4 and LiBF4 dissolved as nonaqueous electrolyte 20 held in the enclosure bag 14, for example is used. Furthermore, in the enclosure bag 14, the positive-electrode board 30 and the negative-electrode board 32 which are dipped in nonaqueous electrolyte 20 are enclosed, and these positive-electrodes board 30 and the negative-electrode board 32 consist of a metal base (not shown) of the metallic foil called charge collector or an expanded metal, and an active material layer (not shown) formed on the metal base. Moreover, between the positive-electrode board 30 and the negative-electrode board 32, the separator 34 for preventing diffusion of nonaqueous electrolyte 20 is arranged.
[0022] furthermore, the metal base of the positive-electrode board 30 -- lead wire 36 -- minding -- the lead of the 1st of 1st lead-wire 18a -- a conductor -- it connects with the end of 19a -- having -- the 1st lead -- a conductor -- the other end of 19a is prolonged in the exterior of the enclosure bag 14 the metal base of the negative-electrode board 32 -- the lead of the 2nd of 2nd lead-wire 18b -- a conductor -- it connects with the end of 19b through lead wire 38 -- having -- the 2nd lead -- a conductor -- the other end of 19b is prolonged in the exterior of the enclosure bag 14 moreover, the 1st lead -- conductor 19a and the 2nd lead -- a conductor -- a part of 19b is covered with Insulators 21a and 21b, respectively And the 1st lead-wire 18a and 2nd lead-wire 18b are attached in the enclosure bag 14 by [whose insulators 21a and 21b are the insides of the enclosure bag 14] carrying out heat weld with the inside layer 24 most.
[0023] Here, the 1st lead-wire 18a and 2nd lead-wire 18b are explained in detail.
[0024] the 1st lead connected to the positive-electrode board 30 -- what consists of the thing which is not dissolved at the time of electric discharge, for example, aluminum, titanium, or these alloys as conductor 19a is used suitably moreover, the 2nd lead connected to the negative-electrode board 32 -- sludges, such as a lithium, arise at the time of overcharge, or

what consists of the thing which cannot form a lithium alloy etc. easily at the time of the overdischarge to which the potential difference becomes large as conductor 19b, and is hard to dissolve, for example, nickel, copper, or these alloys is used

[0025] insulator 21a -- the 1st lead -- a conductor -- this thermoplastic layer 23a consists of thermoplastic polyolefin resin including thermoplastic layer 23a pasted up on the periphery of 19a as such thermoplastic polyolefin resin -- the 1st lead -- a conductor -- what can be pasted up on 19a uses -- having -- among these, heating -- fusing -- the 1st lead -- a conductor -- since there is an inclination which becomes easier to paste up to 19a, reactant resins or such mixture, such as polyethylene, acid denaturation polyethylene, polypropylene, acid denaturation polypropylene (for example, maleic-anhydride denaturation polypropylene), and an ionomer, are desirable When the polypropylene which is excellent in thermal resistance as a material of the enclosure bag 14 which constitutes the inside layer 24 most is used here, it is desirable to use polypropylene or acid denaturation polypropylene among the above-mentioned thermoplastic polyolefin resin. In this case, compared with the case where polyethylene and an ethylene-vinyl acetate copolymer are used as thermoplastic polyolefin resin, an adhesive property with the layer 24 of an inside is raised most, and the thing of Insulators 21a and 21b and the enclosure bag 14 for which high thermal resistance is given to the nonaqueous electrolyte cell 10 becomes possible. In addition, as the above-mentioned ionomer, the thing over which copolymers, such as a homopolymer or ethylene, methacrylic acids, etc., such as polyethylene and the poly pre pyrene, were made to construct a bridge by Na, Mg, K, etc. is used.

[0026] the lead of the 1st of the above-mentioned thermoplastic layer 23a -- a conductor -- as for the bond strength to 19a, it is desirable that they are 4.9 or more N/cm a bond strength -- less than 4.9 N/cm -- thermoplastic layer 23a and the 1st lead -- a conductor -- seal nature with 19a becomes inadequate, and there is an inclination which nonaqueous electrolyte 20 leaks from the enclosure bag 14 here -- a bond strength -- the 1st lead -- a conductor -- insulator 21a covered by 19a -- the 1st lead -- the force needed for dissociating from conductor 19a -- saying -- the 1st lead -- a conductor -- it is expressed with the force of per unit width of face (1cm) of 19a

[0027] Moreover, insulator 21a contains bridge formation layer 25a on the outside of thermoplastic layer 23a. Bridge formation layer 25a consists of polyolefin resin over which the bridge was constructed. Although polyolefin resin should just be a thing of the enclosure bag 14 in which the inside layer 24 and heat weld are the most possible, it is desirable that the same resin as above-mentioned thermoplastic polyolefin resin is used. This is because there is an inclination for the adhesive strength between thermoplastic layer 23a and bridge formation layer 25a to decline when a different resin from above-mentioned thermoplastic polyolefin resin is used. When the polypropylene which is excellent in thermal resistance as a material of the enclosure bag 14 which constitutes the inside layer 24 most is used here, it is desirable that polypropylene or acid denaturation polypropylene is used as the above-mentioned polyolefin resin. in this case, the case where polyethylene and an ethylene-vinyl acetate copolymer are used as the above-mentioned polyolefin resin -- comparing -- Insulators 21a and 21b and the enclosure bag 14 -- an adhesive property with the layer 24 of an inside and the thermal resistance of the nonaqueous electrolyte cell 10 will improve further most As a method of constructing a bridge in polyolefin resin, the chemistry bridge formation by bridge formation by irradiation of ionizing radiation, such as an electron ray and gamma rays, peroxide, etc., silane bridge formation, etc. are used. When constructing a bridge by ionizing radiation in the above-mentioned polyolefin resin, a bridge formation assistant is added by polyolefin resin if needed. As this bridge formation assistant, trimethylol-propane methacrylate, a pentaerythritol thoria chestnut rate, ethyne glycol dimethacrylate, a triaryl SHIANU rate, triallyl isocyanurate, etc. are used, for example. the time of it being excellent in heat-resistant deformans, even if the polyolefin resin over which the bridge was constructed is heated beyond the melting point, and carrying out heat weld of the insulator 19of 1st lead-wire 18a a with the inside of the enclosure bag 14 -- the 1st lead -- a conductor -- it becomes possible to fully prevent the short-circuit between 18a and the metal layer 22 of the enclosure bag 14

[0028] Moreover, in bridge formation polyolefin resin, it is desirable that the gel molar fraction is 20% - 90%. A gel molar fraction is an index which shows the degree of bridge formation, and says the rate of the gel in the bridge formation polyolefin resin which became insoluble at solvents, such as a xylene, (macromolecule chain which became insoluble). the time of less than 20% of the degree of bridge formation being [a gel molar fraction] insufficient, and carrying out heat weld of the inside of the enclosure bag 14, and the bridge formation layer 25a -- the metal layer 22 of the enclosure bag 14, and the 1st lead -- a conductor -- there is an inclination for 19a to short-circuit On the other hand, when a gel molar fraction exceeds 90%, the degree of bridge formation is too large, the adhesive property between the enclosure bag 14 and bridge formation layer 25a becomes bad, and there is an inclination which nonaqueous electrolyte 20 leaks.

[0029] in addition, the 2nd lead -- a conductor -- insulator 21b covered by 19b is also equipped with thermoplastic layer 23b and bridge formation layer 25b, and the thermoplastic polyolefin resin used in insulator 19a and bridge formation polyolefin resin are used, respectively as the thermoplastic polyolefin resin which constitutes thermoplastic layer 23b, and bridge formation polyolefin resin which constitutes bridge formation layer 25b

[0030] Below, the production method of 1st lead-wire 18a is explained.

[0031] the 1st lead for positive-electrode boards with which first a cross section consists of aluminum plate-like with a rectangle -- a conductor -- 19a is prepared The thermoplastic film which consists of polyolefin resin, such as for example, a maleic-anhydride denaturation low density polyethylene, and, on the other hand, constitutes thermoplastic layer 23a, and the thermoplastic film which should consist of polyolefin resin, such as a low density polyethylene, and should constitute bridge formation layer 25a are produced with a T die or an inflation extruder, respectively. And bridge formation processing is performed about the thermoplastic film which should constitute bridge formation layer 25a. Although the chemistry bridge formation by the irradiation bridge formation by ionizing radiation, such as a gamma ray and an electron ray, peroxide, etc., silane bridge formation, etc. are used as the method of bridge formation processing,

the irradiation bridge formation with possible making a bridge construct from a viewpoint which raises productivity for a short time is the most desirable. And the thermoplastic film which constitutes bridge formation layer 25a obtained in this way and over which the bridge was constructed, and above-mentioned thermoplastic layer 23a are stuck by heat lamination, respectively, are united, and thermoplastic layer 23a and insulator 21a which consists of two-layer [of bridge formation layer 25a] are obtained.
[0032] insulator 21a obtained in this way next -- thermoplastic layer 23a -- the 1st lead -- a conductor -- 19a -- turning -- the 1st lead -- a conductor -- it is made to stick to 19a then, insulator 21a -- heating -- thermoplastic layer 23a and a lead of the 1st of insulator 21a -- a conductor -- heat weld of the 19a is carried out In this way, 1st lead-wire 18a is obtained.
[0033] 2nd lead-wire 18b is also produced by the method mentioned above and the same method. however, the lead of the 2nd of 2nd lead-wire 18b -- a conductor -- 19b -- the 1st lead -- a conductor -- although you may be the material used for 19a, it is desirable to use what consists of copper, for example
[0034] In addition, the production method of 1st lead-wire 18a is not limited to the method mentioned above. For example, after preparing the thermoplastic film of one layer which consists of polyolefin resin and making 1st lead-wire 19a carry out heat weld of this thermoplastic film, 1st lead-wire 19a can be obtained from the outside of this thermoplastic film also by irradiating the electron ray controlled so that transparency distance became smaller than the thickness of a film. In this case, the portion equivalent to which the electron ray was among thermoplastic films is set to bridge formation layer 25a, and the portion equivalent to which an electron ray was not is set to thermoplastic layer 23a.
[0035] An example of a method which next attaches in the enclosure bag 14 the 1st lead-wire 18a and 2nd lead-wire 18b which were mentioned above is explained.
[0036] The enclosure bag 14 with which the 1st lead-wire 18a and 2nd lead-wire 18b are attached is produced as follows. That is, couple preparation of the multilayer film of the shape of a rectangle which contains a metallic foil or a metal layer inside is carried out first, including the layer which becomes a front face from a maleic-acid denaturation polyolefine. Next, these multilayer films are piled up so that the layer of a maleic-acid denaturation polyolefine may counter, and only desired seal width of face heat seals three sides of rectangular circumferences on predetermined heating conditions using a seal machine. In this way, the enclosure bag 14 which has opening is obtained.
[0037] A part of 1st lead-wire 18a and 2nd lead-wire 18b are held through opening of the enclosure bag 14 to such an enclosure bag 14. this time -- insulator 21of insulator 21of 1st lead-wire 18a a, and 2nd lead-wire 18b b -- respectively -- the enclosure bag 14 -- it holds so that it may be most arranged between the inside layers 24 then, the insulators 21a and 21b -- the opening edge of the enclosure bag 14 -- putting -- a seal machine -- using -- the bridge formation layers 25a and 25b of Insulators 19a and 19b, and the enclosure bag 14 -- heat weld of the inside layer 24 is carried out most since the bridge formation layers 25a and 25b are contained in Insulators 19a and 19b and it has been hard coming to fuse insulating layers 21a and 21b at this time -- heating at the time of heat weld -- the 1st lead -- a conductor -- the 2nd lead between 19a and the metal layer 22 of the enclosure bag 14 -- a conductor -- the short-circuit between 19b and the metal layer 22 of the enclosure bag 14 is fully prevented
[0038] In addition, the nonaqueous electrolyte cell which applies the lead wire of this invention is not limited to the operation gestalt mentioned above. That is, the nonaqueous electrolyte cell which applies the lead wire of this invention will not be limited especially if a metallic foil or a metal layer is included in an enclosure bag. For example, the solid electrolyte which consists of a polyethylene oxide, polypropylene oxide, etc. may be used as a nonaqueous electrolyte medium of a nonaqueous electrolyte cell. thus -- the case where a solid electrolyte is used as a nonaqueous electrolyte medium -- a nonaqueous electrolyte cell -- setting -- the 1st lead -- conductor 19a and the 2nd lead -- a conductor -- short-circuit is fully prevented between 19b and the metal layer 22 of the enclosure bag 14
[0039] Hereafter, the content of this invention is more concretely explained using an example.
[Example] (Example 1)
(Production of lead wire)
[0040] First, 1st lead-wire 18a for positive electrodes and 2nd lead-wire 18b for negative electrodes were produced. the 1st lead -- the aluminum plate 5mm and whose length width of face is 100mm in 0.1mm as conductor 19a for thickness -- preparing -- the 2nd lead -- as conductor 19b -- the 1st lead -- a conductor -- the copper plate of the same size as 19a was prepared
[0041] The maleic-anhydride denaturation low-density-polyethylene film whose thickness is 50 micrometers on the other hand (density : 0.92 g/cm3, melt-flow-rate (MFR):1.0g /, and 10min, the melting point : 123 degrees C), the low-density-polyethylene film (it min(s) density: -- 0.92g/cm3 and MFR:1.0 -- g/10) whose thickness is 50 micrometers Melting point: 123 degrees C is prepared, it irradiated and the electron ray of 200kV of acceleration voltage was made to construct a bridge about the low-density-polyethylene film of them, using electron-beam-irradiation equipment, so that an absorbed dose may serve as 30kG(ies). When the gel molar fraction of the low density polyethylene which constructed the bridge was measured at this time, the gel molar fraction was 25%. Moreover, MFR of the above-mentioned maleic-anhydride denaturation low-density-polyethylene film and a low-density-polyethylene film was measured according to JISK-6760 (test temperature : 190 degrees C, a load : 21.17Ns).
[0042] And it stuck and united by carrying out the heat lamination of a maleic-anhydride denaturation low-density-polyethylene film and the low-density-polyethylene film at 150 degrees C. Next, this laminate film was cut and two insulators of a 10mmx10mm square were obtained.
[0043] then, insulator of two sheets 21a -- the 1st lead -- a conductor -- it counters through 19a -- as -- piling up (referring to drawing 3 (a)) -- this state -- the heat press for 150 degree-Cx 10 seconds -- insulator 21a -- the 1st lead -- a conductor -- 19a was made to carry out heat weld (refer to drawing 3 (b)) Similarly, 2nd lead-wire 18b was obtained. the 1st lead -- a conductor -- 19a, insulator 21a, and the 2nd lead -- a conductor -- the bond strengths between 19b and insulator 21b were 5.4 N/cm, respectively

[0044] In addition, it asked for the gel molar fraction of a low density polyethylene as follows. That is, after dissolving into the 120-degree C xylene solvent and leaving a low density polyethylene for 24 hours, the weight of insolubles was measured and it asked for the gel molar fraction by the following formula.
Gel molar-fraction (%) =(insoluble weight / initial mass) x100[0045] Moreover, it asked for the bond strength as follows. That is, thickness prepared first the aluminum plate 5mm and whose length width of face is 100mm by 0.1mm. On the other hand, the above-mentioned laminate film was cut and two insulators of width of face of 5mm and a length 50mm rectangle were prepared. And it carried out as [insert / an aluminum plate], and the insulator of two sheets was piled up. Then, the portion with a length [of an insulator] of 20mm was pressed, heat weld was carried out and the sample for bond-strength measurement was obtained. And it had the portion which is not pressed among insulators, the insulator was pulled as by return, and it asked for the intensity at that time.
(Production of an enclosure bag)
[0046] The aluminum laminate film of the composition of the aluminum layer 40 with a thickness of 25 micrometers and the polyethylene layer 42 whose thickness is 30 micrometers was cut, and the rectangle film 44 of a 100mmx150mm angle was prepared two sheets. Then, as the field of the polyethylene layer 42 became inside, it laid the film 44 of two sheets on top of it, three sides were heat sealed by 5mm width of face (150 degree-Cx 1 minute), and the enclosure bag 46 which one side of mouths opened in this way was obtained (refer to drawing 4).
(Production of a simulation cell)
[0047] After putting five cc of mixed solvents whose rate of a volume ratio of ethylene carbonate/diethyl carbonate is 1/1 into the interior of the obtained enclosure bag 46, a part of 1st obtained lead-wire 18a for positive electrodes and 2nd lead-wire 18b for negative electrodes were set to the interior of the enclosure bag 46. Then, one side in which the enclosure bag 46 remains was heat sealed for the insulators 21a and 21b of the 1st lead-wire 18a and 2nd lead-wire 18b by 5mm width of face by the state where it inserted, respectively, and the simulation cell 48 was obtained (refer to drawing 5).
[0048] Ten simulation cells 48 were produced in the above-mentioned procedure, and it evaluated whether the insulation of lead wire 18a and 18b would be secured about each. concrete -- the aluminum layer 40 of the enclosure bag 46, and the 1st lead -- conductor 19a and the 2nd lead -- a conductor -- it carried out by measuring the number which short-circuited [whether short-circuit takes place between 19b, and] The result is shown in Table 1.
[Table 1]

		実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7
架橋層	材料	低密度ポリエチレン	低密度ポリエチレン	低密度ポリエチレン	低密度ポリエチレン	低密度ポリエチレン	ポリプロピレン混合物	無水マレイン酸変性ポリプロピレン混合物
	照射量 (kGy)	30	150	20	200	30	150	150
	ゲル分率 (%)	25	85	17	92	25	55	62
	対封入袋接着 (N/cm)	> 4.9	> 4.9	> 4.9	3.4	> 4.9	> 4.9	> 4.9
熱可塑層	材料	無水マレイン酸変性低密度ポリエチレン	無水マレイン酸変性低密度ポリエチレン	無水マレイン酸変性低密度ポリエチレン	無水マレイン酸変性低密度ポリエチレン	無水マレイン酸変性低密度ポリエチレン	無水マレイン酸変性ポリプロピレン	無水マレイン酸変性ポリプロピレン
	対導体接着 (N/cm)	5.4	5.4	5.4	5.4	4.1	4.9	4.9
ショート数 (ケ/10 ケ)		0	0	3	0	0	0	0

[0049] As shown in Table 1, about the simulation cell concerning this example, short-circuit did not take place at all.
(Example 2)
[0050] When producing the bridge formation layer of the insulator of the 1st lead wire and the 2nd lead wire, and making the amount of electron beam irradiation to a low density polyethylene an absorbed dose serve as 150kG(ies), except having made the gel molar fraction of a bridge formation low density polyethylene into 85%, ten simulation cells were produced like the example 1, and the insulation of the 1st lead-wire 18a and 2nd lead-wire 18b was evaluated about each. The result is shown in Table 1. As shown in Table 1, short-circuit did not take place at all about the simulation cell concerning this example as well as an example 1.
(Example 3)
[0051] When producing the bridge formation layer of the insulator of the 1st lead wire and the 2nd lead wire, and making the amount of electron beam irradiation to a low density polyethylene an absorbed dose serve as 20kG(ies), except having made the gel molar fraction of a bridge formation low density polyethylene into 17%, ten simulation cells were produced like the example 1, and the insulation of the 1st lead-wire 18a and 2nd lead-wire 18b was evaluated about each. The result is shown in Table 1. Although there was a case where short-circuit took place, about the simulation cell concerning this example as shown in Table 1, there were few the numbers.
(Example 4)
[0052] When producing the bridge formation layers 25a and 25b of the insulators 21a and 21b of the 1st lead-wire 18a and 2nd lead-wire 18b When making it an absorbed dose serve as 200kG(ies), the amount of electron beam irradiation to a low density polyethylene Except having made the gel molar fraction of a bridge formation low density polyethylene into 92%, ten simulation cells were produced like the example 1, and the insulation of the 1st lead-wire 18a and 2nd lead-wire 18b was evaluated about each. The result is shown in Table 1. As shown in Table 1, about the simulation cell concerning this example, short-circuit did not take place at all.

(Example 5)
[0053] shortening the press time when carrying out the heat press of the insulators 21a and 21b at 5 seconds -- a lead -- except having made the bond strength of Conductors 19a and 19b and Insulators 21a and 21b into 4.1 N/cm, ten simulation cells were produced like the example 1, and the insulation of the 1st lead-wire 18a and 2nd lead-wire 18b was evaluated about each The result is shown in Table 1. As shown in Table 1, short-circuit did not take place at all about the simulation cell concerning this example as well as an example 1.
(Example 6)
(Production of lead wire)
[0054] As 1st lead-wire 18a for positive electrodes, and the 2nd lead-wire 18b for negative electrodes, the same thing as an example 1 was used.
[0055] On the other hand, the maleic-anhydride denaturation polypropylene film (density : 0.89 g/cm3, MFR:2.8g /, and 10min, the melting point : 140 degrees C) whose thickness is 50 micrometers, and the film with which it is thin from the polypropylene mixture which is 50 micrometers were prepared. Here, to the random type polypropylene (density : 0.9 g/cm3, MFR:1.2g /, and 10min, the melting point : 130 degrees C) 100 weight section, polypropylene mixture carried out 1 weight section addition of the trimethylolpropanetrimethacrylate, and produced this by mixing with a roll mixer. Moreover, the film which consists of polypropylene mixture was produced by extruding polypropylene mixture with a film extruder. In addition, MFR of the above-mentioned maleic-anhydride denaturation polypropylene and polypropylene was measured according to JISK-6758 (test temperature : 230 degrees C, a load : 21.17Ns).
[0056] Among these, it irradiated and the electron ray of 200kV of acceleration voltage was made to construct a bridge about the film which consists of polypropylene mixture, using electron-beam-irradiation equipment, so that an absorbed dose may serve as 150kG(ies). When the gel molar fraction of the film obtained in this way was measured like the example 1 at this time, the gel molar fraction was 55%.
[0057] And two insulators of a 10mmx10mm square were obtained like the example 1 except having carried out the heat lamination of a maleic-anhydride denaturation poly polypropylene film and the film which consists of polypropylene mixture which constructed the bridge at 180 degrees C.
[0058] then, insulator 21a and the 1st lead of two sheets -- a conductor -- 1st lead-wire 18a was produced like the example 1 except having performed heat weld with 19a on 180 degrees C and the conditions for 10 seconds 2nd lead-wire 18b was produced similarly. and the 1st lead -- a conductor -- 19a, insulator 21a, and the 2nd lead -- a conductor -- when the bond strength between 19b and insulator 21b was measured like the example 1, they were 4.9 N/cm, respectively
(Production of an enclosure bag)
[0059] It replaced with the polyethylene layer 42 with a thickness of 30 micrometers, the aluminum laminate film which has a polypropylene layer with a thickness of 30 micrometers was prepared, and the enclosure bag 46 which one side of mouths opened was obtained like the example 1 except having heat sealed three sides of the rectangle film 44 of two sheets cut down and piled up from this aluminum laminate film at 180 degrees C.
(Production of a simulation cell)
[0060] In this way, ten simulation cells 48 were produced like the example 1 using the 1st obtained lead-wire 18a for positive electrodes, the 2nd lead-wire 18b for negative electrodes, and the enclosure bag 46. And it evaluated like the example 1 whether the insulation of lead wire 18a and 18b would be secured about each of the simulation cell 48. The result is shown in Table 1. As shown in Table 1, short-circuit did not take place at all about the simulation cell concerning this example as well as an example 1.
(Example 7)
[0061] It replaced with the polypropylene in polypropylene mixture, and ten simulation cells were produced like the example 6 except having used maleic-anhydride denaturation polypropylene (density : 0.89 g/cm3, MFR:2.8g /, and 10min, the melting point : 140 degrees C). in addition, the 1st lead -- conductor 19a and the 2nd lead -- a conductor -- when the gel molar fraction was measured like the example 1 about each of the maleic-anhydride denaturation polypropylene film with which the bridge was constructed of the insulators 21a and 21b which cover 19b, the gel molar fraction was 62% moreover, the 1st lead -- a conductor -- 19a, insulator 21a, and the 2nd lead -- a conductor -- when the bond strength between 19b and insulator 21b was measured like the example 1, they were 4.9 N/cm, respectively
[0062] And the insulation of the 1st lead-wire 18a and 2nd lead-wire 18b was evaluated like the example 1 about each of the simulation cell 10 obtained as mentioned above. The result is shown in Table 1. As shown in Table 1, short-circuit did not take place at all about the simulation cell concerning this example as well as an example 1.
[0063]
[Effect of the Invention] a lead according to melting of an insulator since the bridge formation layer which an insulator becomes from bridge formation polyolefin resin is included according to this invention as explained above, when lead wire is attached in a bag body by heat weld -- the short-circuit between a conductor and the metal layer of a bag body is fully prevented, and can fully secure the insulation of lead wire

---

[Translation done.]

*.NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] the lead which is the lead wire for nonaqueous-electrolyte cells welded to the inside of the bag body which encloses a nonaqueous-electrolyte medium, a positive electrode, and a negative electrode, including a metal layer, and is electrically connected to the aforementioned positive electrode or the aforementioned negative electrode -- a conductor and the aforementioned lead -- the lead wire for nonaqueous-electrolyte cells characterized by what a conductor covers, it has the insulator welded to the inside of the aforementioned bag body, and the bridge-formation layer which the aforementioned insulator becomes from bridge-formation polyolefin resin is included for
[Claim 2] the aforementioned insulator -- the aforementioned lead -- a lead wire for nonaqueous electrolyte cells according to claim 1 characterized by including the thermoplastic layer which pastes a conductor and consists of thermoplastic polyolefin resin
[Claim 3] the aforementioned lead -- a lead wire for nonaqueous electrolyte cells according to claim 2 characterized by the bond strength of the aforementioned thermoplastic layer to a conductor being 4.9 or more N/cm
[Claim 4] Lead wire for nonaqueous electrolyte cells given in any 1 term of the claims 1-3 characterized by the gel molar fraction of the aforementioned bridge formation polyolefin resin being 20 - 90%.
[Claim 5] Lead wire for nonaqueous electrolyte cells given in any 1 term of the claims 1-4 characterized by a bridge being constructed over the aforementioned bridge formation polyolefin resin by irradiation of ionizing radiation.
[Claim 6] Lead wire for nonaqueous electrolyte cells given in any 1 term of the claims 2-5 characterized by being one sort or two sorts or more of mixture chosen from the group which the aforementioned thermoplastic polyolefin resin becomes from polyethylene, acid denaturation polyethylene, and an ionomer.
[Claim 7] Lead wire for nonelectrolyte cells given in any 1 term of the claims 2-5 characterized by the aforementioned thermoplastic polyolefin resin being polypropylene or acid denaturation polypropylene.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing 1 is the perspective diagram showing the nonaqueous electrolyte cell by which the lead wire for nonaqueous electrolyte cells of this invention is applied.
[Drawing 2] Drawing 2 is the cross section which met the A-A line or B-B line of drawing 1 .
[Drawing 3] The plan showing the 1st lead wire which drawing 3 (a) requires for an example 1, and (b) are the cross-sectional views of the 1st lead wire.
[Drawing 4] Drawing 4 is drawing of longitudinal section of the enclosure bag concerning an example 1.
[Drawing 5] Drawing 5 is the front view of the simulation cell concerning an example 1.
[Description of Notations]
14 -- a bag body, 18a, the lead wire for 18b-- nonaqueous electrolyte cells, 19a, and a 19b-- lead -- a conductor, 20 -- nonaqueous electrolyte medium, 21a, and 21b-- an insulator, 22 -- metal layers, 23a, a 23b-- thermoplastic layer, 25a, and 25b-- a bridge formation layer, 30 -- positive electrode, and 32 -- negative electrode

---

[Translation done.]

た。その結果を表１に示す。表１に示すように、本実施例に係る模擬電池についても、実施例１と同様、ショートが全く起こらなかった。

【００６３】

【発明の効果】以上説明したように本発明によれば、絶縁体が架橋ポリオレフィン樹脂からなる架橋層を含むため、リード線が袋体に熱融着によって取り付けられるときに、絶縁体の溶融によるリード導体と袋体の金属層との間のショートが十分に防止され、リード線の絶縁性を十分に確保することができる。

【図面の簡単な説明】

【図１】図１は、本発明の非水電解質電池用リード線が適用される非水電解質電池を示す斜視図である。

【図２】図２は、図１のＡ－Ａ線又はＢ－Ｂ線に沿った断面図である。

【図３】図３（ａ）は、実施例１に係る第１のリード線を示す平面図、（ｂ）は第１のリード線の横断面図である。

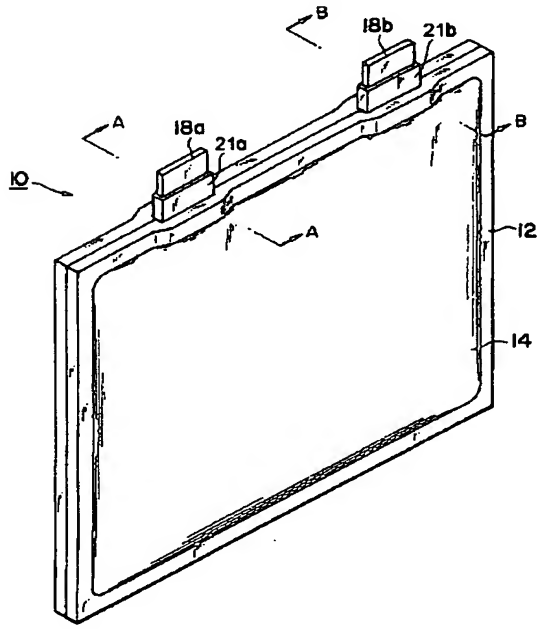
【図４】図４は、実施例１に係る封入袋の縦断面図である。

【図５】図５は、実施例１に係る模擬電池の正面図である。

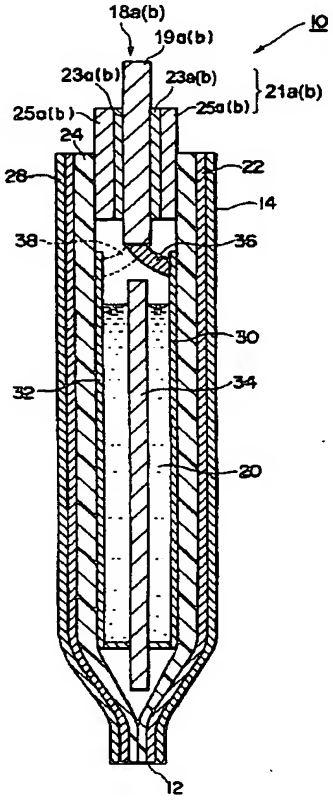
【符号の説明】

１４…袋体、１８ａ，１８ｂ…非水電解質電池用リード線、１９ａ，１９ｂ…リード導体、２０…非水電解質媒体、２１ａ，２１ｂ…絶縁体、２２…金属層、２３ａ，２３ｂ…熱可塑層、２５ａ，２５ｂ…架橋層、３０…正極、３２…負極。

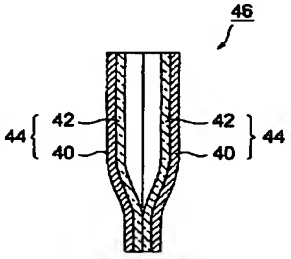
【図１】



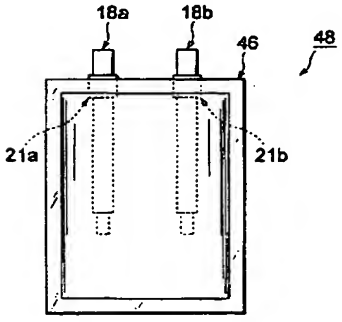
【図２】



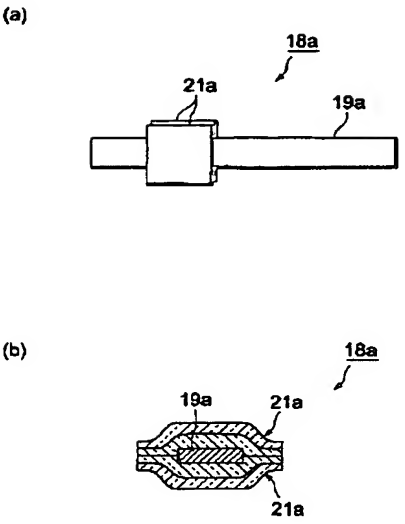
【図４】



【図５】



【図3】



【手続補正書】
【提出日】平成１２年7月２４日（２０００．７．２４）
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】特許請求の範囲
【補正方法】変更
【補正内容】
【特許請求の範囲】
【請求項１】　金属層を含み且つ非水電解質媒体、正極及び負極を封入する袋体の内面に融着される非水電解質電池用リード線であって、
前記正極又は前記負極に電気的に接続されるリード導体と、
前記リード導体を被覆し、前記袋体の内面に融着される絶縁体とを備え、
前記絶縁体が、ゲル分率が２０～９０％である架橋ポリオレフィン樹脂からなる架橋層と、前記リード導体に接着され且つ熱可塑性ポリオレフィン樹脂からなる熱可塑層とを含む、ことを特徴とする非水電解質電池用リード線。
【請求項２】　前記リード導体に対する前記熱可塑層の接着強度が４．９Ｎ／ｃｍ以上であることを特徴とする請求項１に記載の非水電解質電池用リード線。
【請求項３】　前記架橋ポリオレフィン樹脂が電離放射線の照射により架橋されたものであることを特徴とする請求項１又は２に記載の非水電解質電池用リード線。
【請求項４】　前記架橋層が、前記熱可塑層を構成する熱可塑性ポリオレフィン樹脂と同じ樹脂に電離放射線を照射して架橋せしめた架橋ポリオレフィン樹脂からなることを特徴とする請求項１～３のいずれか一項に記載の非水電解質電池用リード線。
【請求項５】　前記ポリオレフィン樹脂がポリエチレン、酸変性ポリエチレン及びアイオノマーからなる群より選ばれる１種又は２種以上の混合物であることを特徴とする請求項１～４のいずれか一項に記載の非水電解質電池用リード線。
【請求項６】　前記ポリオレフィン樹脂がポリプロピレン又は酸変性ポリプロピレンであることを特徴とする請求項１～４のいずれか一項に記載の非電解質電池用リード線。
【請求項７】　前記非電解質電池用リード線が融着されるべき前記袋体がポリプロピレンからなる内側層を有するものであり、前記架橋ポリオレフィン樹脂が架橋されたポリプロピレン又は架橋された酸変性ポリプロピレンであり且つ前記熱可塑性ポリオレフィン樹脂がポリプロピレン又は酸変性ポリプロピレンであることを特徴とする請求項１～４のいずれか一項に記載の非電解質電池用リード線。
【手続補正２】
【補正対象書類名】明細書
【補正対象項目名】０００７
【補正方法】変更
【補正内容】
【０００７】